

## SEASONAL VARIATION AND DIET SELECTION FROM PELLET REMAINS OF SHORT-EARED OWLS (*ASIO FLAMMEUS*) IN WYOMING

Eric Stone<sup>1</sup>, Jocelyn Smith<sup>1,2</sup>, and Polly Thornton<sup>1</sup>

*Key words:* Short-eared Owls, *Asio flammeus*, diet selection, predators, Wyoming.

Short-eared Owls (*Asio flammeus*) are medium-sized predators of open country, sage flats, grasslands, and roadsides. Often active well after sunrise, they are more diurnal than other owls in northwest Wyoming (Karulus and Eckert 1974, Clark 1985). Their foraging areas significantly overlap those of both smaller and larger owls, namely Great Horned Owls (*Bubo virginianus*) and Burrowing Owls (*Speotyto cunicularia*) (E. Stone unpublished data, Karulus and Eckert 1974). Prey sources, including small mammals, birds, and insects, are diverse and overlap those used by Great Horned Owls.

This study examines shifts in prey sources through the breeding season by identifying prey remains in Short-eared Owl pellets from wild birds. Shifts in prey sources may be the result of changes in prey abundance or availability, or competition with other owl species for the same resources. Additionally, shifts may result from changes in dietary requirements of adults or their developing dependent offspring. In this study we sought to describe whether shifts in diet occurred and, if so, what types. This descriptive study may serve as a useful baseline of data upon which future studies can be based.

### METHODS AND STUDY AREA

The Short-eared Owl study area was an old irrigation ditch located approximately 2.2 km southwest of the Teton Science School in Grand Teton National Park, Wyoming. Short-eared Owl pellets were located by searching on the ground and at the base of willows (*Salix* sp.), mountain alder (*Alnus tenuifolia*), aspen (*Populus tremuloides*), and narrowleaf cottonwood (*Populus angustifolia*). One active nest

was located within 20 m of the ditch and another within 2 km. We observed as many as four owls roosting along the ditch, either on the ground, in the shade of trees, or perched on the lower branches.

At the end of each month (March–October) all pellets were collected at the study site. Thus, each group of pellets collected and their contents could be assumed to have originated during that month. Short-eared Owls were no longer seen in the study area in late October and were presumed to have migrated to areas with ample winter prey, shallower snowpack, or both. Owls were first seen using the roost site in early March. To assure large enough sample sizes, we combined sample months into the following seasonal groups: spring (March, April, and May), summer (June and July), and fall (August, September, and October).

Prey items were identified using skull and teeth parts found in individual pellets. Pellet remains of *Microtus montanus* and *M. longicaudus* were not distinguishable by skull or teeth parts and were combined into a prey category hereafter referred to as *M. mont-long*.

### RESULTS

Short-eared Owl pellets contained 11 different prey items. Of these, the 6 most common prey types constituted 94.42% of the diet. A significant decline in sage voles (*Lagurus curtatus*) in the fall diet of Short-eared Owls was augmented by an increase in the proportions of northern pocket gophers (*Thomomys talpoides*) and southern red-backed voles (*Clethrionomys gapperi*) (Table 1). The complete disappearance of *L. curtatus* in fall, with increases in both the number and proportion

<sup>1</sup>Teton Science School, Box 68, Kelly, Wyoming 83011.

<sup>2</sup>Present address: 454 Route 32 North, New Paltz, New York 12561.

TABLE 1. Seasonal percentages of prey items found in Short-eared Owl pellets.

Prey type	Mar-Apr-May	Jun-July	Aug-Sep-Oct	Totals
<i>Microtus mont-long</i>	41.37	46.15	42.28	42.92
<i>Thymomys talpoides</i>	10.34	17.31	27.64*	21.03
<i>Peromyscus maniculatus</i>	24.14	17.31	16.26	18.45
<i>Lagurus curtatus</i>	13.79	13.46	0.00*	6.44
<i>Clethrionomys gapperi</i>	1.72	3.85	8.13*	5.58
<i>Sorex</i> sp.	3.45	0.00	2.44	2.15
<i>Zapus princeps</i>	3.45	1.92	0.00	1.29
<i>Tamias minimus</i>	0.00	0.00	0.81	0.43
<i>Microtus pennsylvanicus</i>	0.00	0.00	0.81	0.43
Unknown bird	0.00	0.00	0.81	0.43
Unidentified beetle	0.00	0.00	0.81	0.43
NUMBER OF PREY ITEMS	58	52	123	233

\*Significant increase or decrease in diet ( $P < .05$ , chi-square post-hoc cell contributions).

of *T. talpoides* and *C. gapperi* in the diet of Short-eared Owls, represents a significant seasonal change in overall diet selection or foraging locations.

#### DISCUSSION

Short-eared Owl's significant seasonal variation in prey selection may be reflective of changes in the availability of their prey. Sagebrush voles (*Lagurus curtatus*) are reported to become inactive during dry periods corresponding to late summer and fall in western Wyoming (Clark and Stromberg 1987:177). Declines in prey such as *L. curtatus*, found in open areas containing sage or grassland habitats, may indicate that Short-eared Owls forage more in forest edges or under tree canopies during the latter part of the summer. These habitats are where *M. montanus*, *M. longicaudus*, and *C. gapperi* are found. *T. talpoides*, which also increased in the diet later in the season, is found in a variety of habitats with loose soil (Clark and Stromberg 1987).

In Grand Teton National Park and elsewhere, there is strong evidence that small mammal prey availability is dependent on environmental factors and climate (Pinter 1988). In 1993, one year later, a continuation of this study was planned. However, a sudden and prolonged period of warm temperatures resulted in rapid snowmelts and subsequent flooding of the subnivean environment (personal observation). Population studies of small mammals being conducted in the same area found that 1993 summer populations were the lowest recorded in 25 years of monitoring (A. Pinter personal communication).

In 1993 Short-eared Owls were first seen at the study area on 15 March but were absent for the duration of the summer. It was assumed that the owls moved their foraging and breeding activities to areas that were not affected by the subnivean flooding and depression of small mammal populations. These observations and the results of more normal years suggest that Short-eared Owls possess the flexibility to shift diets and foraging areas with changing seasonal or annual prey availability.

#### ACKNOWLEDGMENTS

The manuscript benefited from comments made by Robert C. Whitmore and an anonymous reviewer. Steve Cain and Rick Wallen of Grand Teton National Park offered insights and supported our efforts throughout the study.

#### LITERATURE CITED

- CLARK, R. J. 1985. A field study of the Short-eared Owl, *Asio flammeus* (Pontoppidan), in North America. Wildlife Monograph 47.
- CLARK, T. W., AND M. R. STROMBERG. 1987. Mammals in Wyoming. University Press of Kansas, Lawrence.
- KARULUS, K. E., AND A. W. ECKERT. 1974. The owls of North America. Doubleday, Garden City, New York.
- PINTER, A. J. 1988. Multiannual fluctuations in precipitation and population dynamics of the montane vole, *Microtus montanus*. Canadian Journal of Zoology 66: 2128-2132.

Received 19 March 1993  
Accepted 28 September 1993